

Neurological Findings & Symptoms Associated with Acute Combat-related Concussion:

Impact of Migraine and Other Co-morbidities

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Disclosures

- The views expressed are those of the author and do not reflect the official policy of the Department of the Army, the Department of Defense or the U.S. Government.
- No commercial support.

Concussion/mTBI Among Returning Service Member

TBI Numbers By Severity - All Armed Forces

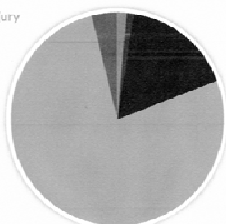


DoD Numbers for Traumatic Brain Injury
'00-'11 Q2 Totals

Penetrating	3,631
Severe	2,288
Moderate	36,752
Mild	169,209
Not Classifiable	8,550

Total - All Severities 220,430

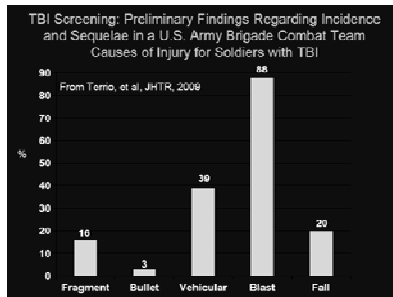
Source: Armed Forces Health Surveillance Center



Numbers for 2000-2011 Q2, as of 15 Aug 2011

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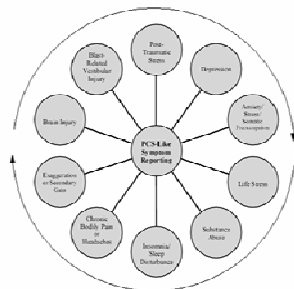
Causes of Concussion



Concussion - 4 Symptom Categories

- Physical (10)
 - Headache
 - Fatigue
 - Dizziness
 - Sensitivity to light and/or noise
 - Nausea/ vomiting
 - Balance problems
 - Numbness/ tingling
 - Visual problems
- Cognitive (4)
 - Difficulty remembering
 - Difficulty concentrating
 - Feeling slowed down
 - Feeling mentally foggy
- Emotional (4)
 - Irritability
 - Sadness
 - Feeling more emotional
 - Nervousness
- Sleep (4)
 - Drowsiness
 - Sleeping less than usual
 - Sleeping more than usual
 - Trouble falling asleep

Factors that Influence Reporting of Post-Concussion-Like Symptoms



From Iverson et al., 2009

Concussion in Deployed Setting Does NOT Occur in Isolation

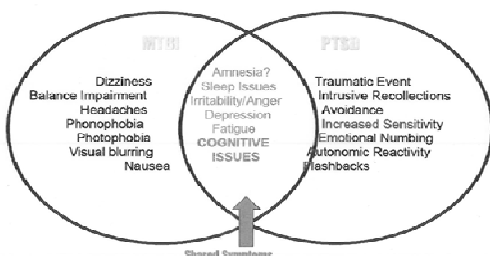
Co-morbid Conditions

- Concurrent Injuries
- Prior concussion(s)
- Acute Stress Reaction/PTSD
- Migraine
- Sleep Disorder
- Mood Disorder
- Chronic pain
- Medication misuse
- Substance abuse

Pre-morbid Factors

- Past experiences
- Perception of experience
- Coping Skills/ Resilience
- Combat Operational Stress (COSR)
- Psychosocial stressors
- Sleep impairment
- Personality (motivation)
- Expectations
- Unit Cohesion

MTBI and PTSD – Overlapping Conditions?



Flynn, Frederick . Combat Related mTBI and Co-morbidities, AAN 2010

Post-traumatic Headache (PTHA)

- HA onset within 7 days after trauma
- Most common post-concussive symptom (31-96%)
- Heterogeneous group, ± trauma related
- 70-96 % meet criteria for primary HA disorder
- Post-traumatic migraine common (28-60%); most common subtype in military (≈ 89%)
- Risk factors for chronic HA: females, prior HA, medication overuse, mild head trauma, migraine features
- Co-morbidities often present

Objectives

- Describe the clinical characteristics of a sample of SMs with concussion
 - Concussion symptoms
 - Acute and chronic co-morbidities
 - Association of co-morbidities with return to duty
 - Pre-deployment & Post-traumatic headache features
- Discuss the implications for clinicians
 - Importance of careful evaluation and symptom attribution to optimize care and recovery

Methods

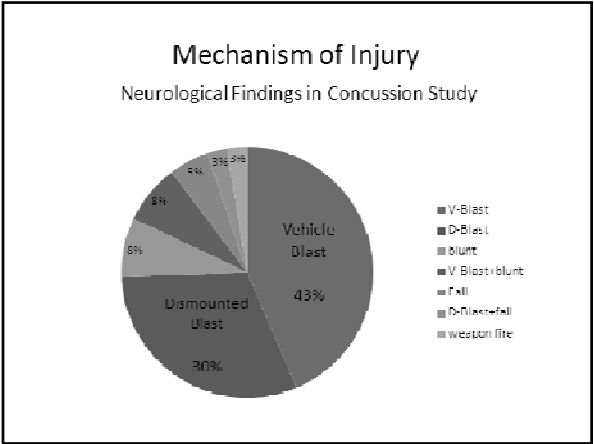
- 40 Service Members with acute concussion evaluated and followed in theater by a neurologist
 - Average follow-up = 33 days (median 18 days)
 - Average visits = 4 (median 3)
- Reviewed and abstracted clinical records
- Calculated frequencies for concussion symptoms, acute and chronic co-morbidities
- Investigated characteristics of headaches, highlighting migrainous features
- Explored the association of co-morbidities with return to duty

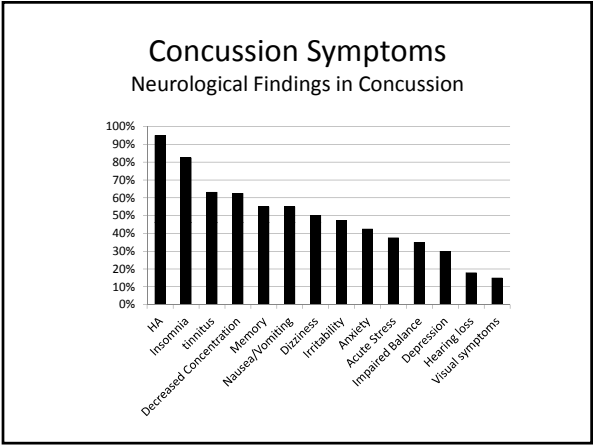
Characteristics of the Study Population

Neurological Findings in Concussion

N = 40

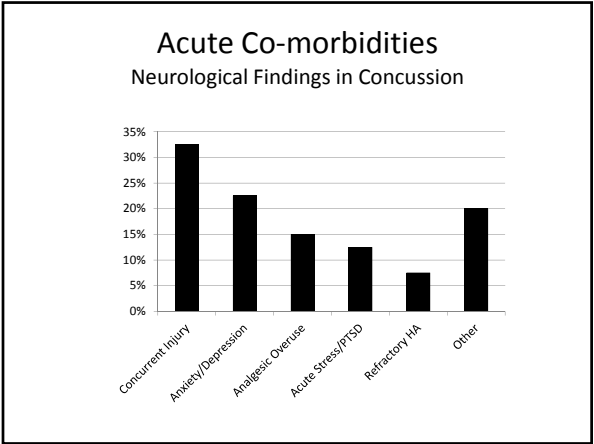
- | | |
|------------------------|--------------------------|
| • Mean age: 29±9 years | • Concussion Grade |
| • Gender | – Grade 1: 14 (35 %) |
| – Male: 37 (92%) | – Grade 2: 21 (53 %) |
| – Female: 3 (8%) | – Grade 3: 5 (12 %) |
| • Returned to duty | • h/o prior concussion |
| – Full: 19 (50 %) | – Recent : 19 (48%) |
| – Limited: 10 (26 %) | • ≥ 3 past year: 9 (23%) |
| – Evacuated: 9 (24 %) | – Remote: 8 (20%) |

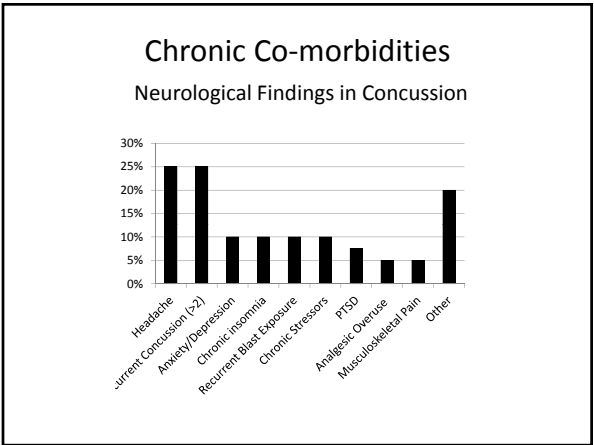


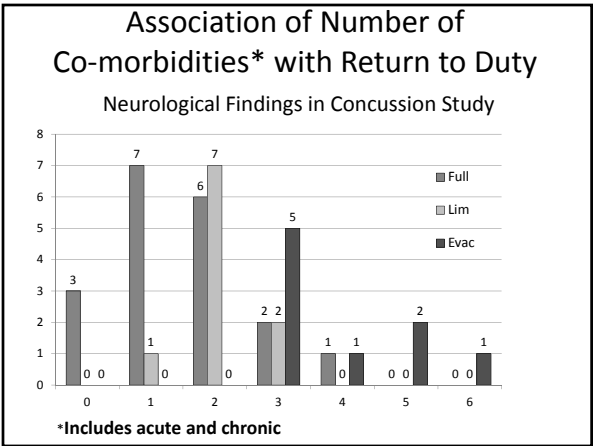


Co-morbid Conditions
Neurological Findings in Concussion

Acute	Chronic
<ul style="list-style-type: none">• Concurrent Injury• Anxiety/ Depression• Analgesic Overuse• Acute Stress Reaction/PTSD• Refractory Headaches• Other	<ul style="list-style-type: none">• Anxiety/ Depression• Analgesic Overuse• PTSD• Chronic stressors• Headache• Insomnia• Musculoskeletal conditions• Recurrent Concussion• Recurrent Blast Exposure• Other







Pre-deployment Headache History

N=40

- h/o migraine DX : 5 (**12.5%**)
- Known FH migraine : 10 (**25%**)
- Prior h/o of any headaches: 25 (62.5%)
 - Presence of migrainous features or triggers: 21 (**52%**)

Pre-deployment Headaches

n= 25

<u>Frequency</u>	<u>Severity</u>
"infrequent": 15 (60%)	• Mild - moderate: 6 (24%)
1-4/month : 7 (28%)	• Mod-severe: 10 (40%)
>4/month: 1 (4%)	• Unreported: 9 (36 %)
Unreported: 2 (8%)	

Headache Features & Triggers*

Typical migraine triggers: 9 (36%)
Typical migraine features : 8 (32%)
Childhood HAs w/ migrainous features: 1 (4%)
"Sinus HAs": 1 (4%) Motion Sickness: 1 (4%)

* **Presence of ≥ 1 of these features: 21 (84%)**

Post-traumatic Headaches

n= 38

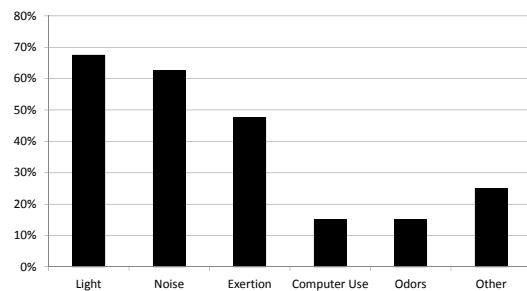
<u>Frequency</u>	<u>Severity</u>
"infrequent": 2 (5.2%)	Mild-moderate: 10 (26%)
2-4/month: 2 (5.2%)	Mod -severe: 28 (74%)
1-6/week: 9 (23.5%)	
Daily: 26 (68%)	

Headache Features

Unilateral: 26 (68%)	Aura: 2 (5%)
Throbbing: 32 (84%)	Dizziness/Vertigo: 10 (26%)
Photophobia: 28 (74%)	Nausea/Vomiting: 25 (66%)
Phonophobia: 20 (53%)	Relief with sleep: 27 (71%)

Post-traumatic Headache Triggers

n=38



Post-traumatic Headache Treatment

n=38

- Abortive treatment
 - Triptan use : 16 (42%) *75% response rate*
 - NSAID use : 32 (84%) *81% response rate*
- Prophylaxis
 - Amitriptyline : 24 (63%)
 - Other: 2 (5%)
- All patients received headache/migraine education on potential triggers and lifestyle factors

Study Limitations

- Very small number of participants (statistical testing not possible)
- Findings may not be representative of all Service Members with concussion
- Data based on self-report and clinical impression

Conclusions

- Concussion in deployed settings does not occur in isolation. Co-morbidities are common.
- Presence of multiple co-morbidities appears to influence recovery ; more research is needed.
- Post-traumatic headaches often fully c/w migraine, potentially related to pre-deployment susceptibility as supported by detailed history. Acute post-traumatic migraine responds to appropriate therapy.
- Despite widespread screening and advances in technology, detailed clinical assessment remains the hallmark of successful diagnosis and management of concussion.

Knowledge Gaps, Challenges, and Future Research

- Is post-traumatic migraine generated by the same mechanisms as idiopathic migraine?
- How do we best care for Service Members with multiple co-morbidities?
- **Does migraine and other co-morbidities account for many of the symptoms attributed to acute concussion?**

Further clinical research required for co-morbidity recognition and management, including post-traumatic migraine.

We need a standardized data collection system to support rigorous prospective studies.

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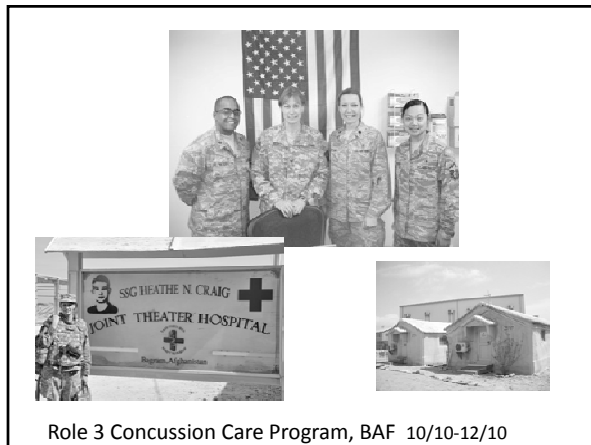


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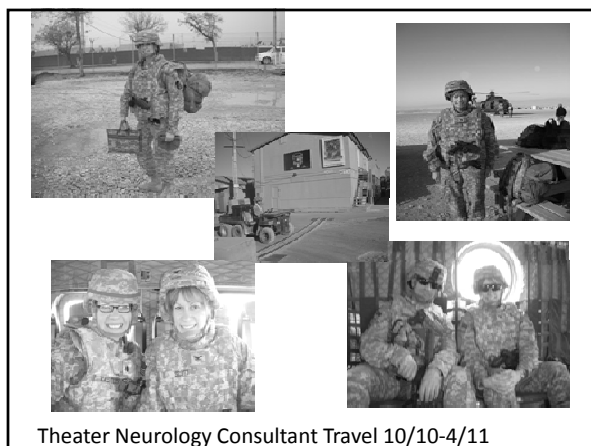
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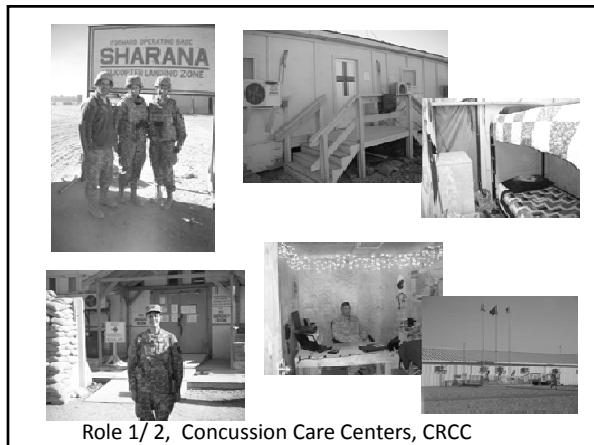
Role 3 Concussion Care Program, BAF 10/10-12/10



Theater Neurology Consultant Travel 10/10-4/11



Scenes of Afghanistan



Role 1/ 2, Concussion Care Centers, CRCC

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